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POWER SUPPLY

INSTRUCTION MANUAL

kepco inc.®

131-38 SANFORD AVENUE • FLUSHING 52, N. Y.
Area Code 212 IN 1-7000 • TWX # NY 4-5196

INSTRUCTION MANUAL

VOLTAGE REGULATED POWER SUPPLY

MODEL SM 325-2X
AND SM 325-2MX

SERIAL NO. . . . . .

kepco inc. 131-38 SANFORD AVENUE • FLUSHING 52, N. Y. • Area Code 212 IN 1-7000 • TWX # NY 4-5196

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SPECIFICATIONS AND CONTROLS FOR MODELS SM 325-2X AND SM 325-2MX

I. ELECTRICAL AND PHYSICAL SPECIFICATIONS:

....DC OUTPUT VOLTAGE:
0-325 volts DC, continuously variable.

....DC OUTPUT CURRENT:
0-2 amperes, continuous duty.

....AC INPUT:
105-125 volts, 60 ± 1/2 cps, 12 amperes (max.).

....REGULATION:
Line: Less than 0.01% for 105-125 volt line change at any output voltage within specified range.
Load: Less than 0.01% or 0.001 volt, whichever is greater, for 0-2 ampere step load change, at any output voltage within specified range.

....RIPPLE:
Less than 0.001 volts rms.

....STABILITY:
Output voltage variation is less than 0.01% or 0.001 volt, whichever is greater, over a period of 8 hours, after unit has reached equilibrium. Approximately 3/4 of an hour is required for this unit to reach equilibrium from a "cold start".

....OUTPUT IMPEDANCE:
Less than 0.2 ohm from DC to 1 KC.
Less than 1.0 ohm from 1 KC to 100 KC.

....RECOVERY TIME:
50 microseconds.
Recovery time is defined as time required for output voltage to return to within 0.1 volts of output voltage setting.

....TEMPERATURE COEFFICIENT:
Output voltage changes less than 0.01% per unit C.

....AMBIENT OPERATING TEMPERATURE:
-20 C to +50 C maximum. Protective circuit turns off unit whenever over-temperature condition occurs in pass elements. Interrupting input power resets unit.

....STORAGE TEMPERATURE:
-40 C to +85 C.

....DIMENSIONS:
8-3/4" high x 19" wide x 13-7/8" deep (behind panel).

....COLOR:
Kepco Standard Gray Hammertone.

....METERS: (APPLIES ONLY TO MODEL SM 325-2MX)
Voltmeter: 0-400 volts, 2-1/2".
Ammeter: 0-2 amps, 2-1/2".

II. TERMINALS AND CONTROLS:

....(On front panel):

....DC OUTPUT AND GROUND binding posts, clearly marked. Output terminals isolated from chassis; either positive or negative terminal may be grounded.
....VOLTAGE CONTROL, continuously variable, for setting output voltage.
....POWER ON-OFF switch, energizes power and auxiliary transformers.

....(At rear of unit):
....DC OUTPUT AND GROUND binding posts, clearly marked; either positive or negative terminal may be grounded.
....REMOTE ERROR SENSING binding posts provide means of maintaining specified regulation directly at the load. (See P. C-2).

III. PROTECTIVE FEATURES:

....REFERENCE FUSE (ac) for auxiliary supplies.
....POWER FUSE (ac) for line power input.
....DC FUSE for main supply.

....OVERLOAD PROTECTION:
Provided by inherent current limiting action of FLUX-O-TRAN. Output may be shorted momentarily without damage to unit. Continuous overload or short will blow DC FUSE.

....OVER-TEMPERATURE PROTECTION:
Thermostat relay control turns unit off if temperature of pass elements exceeds safe limit. Relay is reset by interrupting input power with ON-OFF switch on front panel, or by disconnecting line cord from power source.

SECTION B

BRIEF THEORY:

Two circuit schematic drawings titled "POWER UNIT" and "CONTROL UNIT" are included in the Reference Index of this instruction manual. These drawings contain designations corresponding to the capitalized terms in the following discussion.

Some basic functional relationships in this power supply are illustrated in block Diagram B-1 (Page B-2A).

The POWER UNIT includes:

DC SOURCES:

....MAIN SUPPLY - (consisting of a Kepco "Flux-O-Tran" transformer, full wave bridge rectifier, and capacitive filter) provides line regulated DC power for the output, via the PASS CIRCUITRY.

....AUXILIARY SUPPLIES: COLLECTOR SUPPLY (negative full wave rectified) for PASS CIRCUITRY driver stages not connected to MAIN SUPPLY; I_{CO} SUPPLY (full wave rectified) compensates for spurious biasing effects of collector leakage current; RETURN SUPPLY (full wave rectified) acts as leakage current path for series pass transistors and as bleed path to provide minimum operating current for pass transistors; CONTROL UNIT SUPPLY (full wave rectified).

PASS CIRCUITRY:

The power transistors which function as pass elements (i.e. are in series with the load) may be regarded effectively as variable resistors (or conductors) controlled by a CONTROL SIGNAL. The current "passed" by these elements is a function of the emitter-base bias. The CONTROL SIGNAL is applied to the base terminal; hence a negative CONTROL SIGNAL will aid the forward conduction of a PNP transistor while a positive CONTROL SIGNAL will reduce the forward conduction. In response to the CONTROL SIGNAL the pass elements effect a current and voltage distribution in the main DC loop which holds the output voltage constant.

The CONTROL UNIT includes:

REFERENCE CIRCUITRY:

The function of the REFERENCE CIRCUITRY is to maintain a precise, stable, voltage standard for the COMPARISON AMPLIFIER.

COMPARISON AMPLIFIER:

The COMPARISON AMPLIFIER is essentially a series of cascaded transistor amplifiers which boost the differential error signal produced in the COMPARISON BRIDGE to a level sufficient to drive the PASS CIRCUITRY. The COMPARISON AMPLIFIER is connected across the COMPARISON BRIDGE from the junction of the VOLTAGE CONTROL and the REFERENCE RESISTANCE to the junction of the REFERENCE DIODE and the negative output terminal (See Diagram on Page B-2A). This arrangement is similar to that of a null galvanometer across a Wheatstone bridge. Unbalance in the COMPARISON BRIDGE is amplified to produce a CONTROL SIGNAL of suitable magnitude and phase to effect corrective action by the PASS CIRCUITRY.

COMPARISON BRIDGE: (See Diagram B-2, Page B-2A).

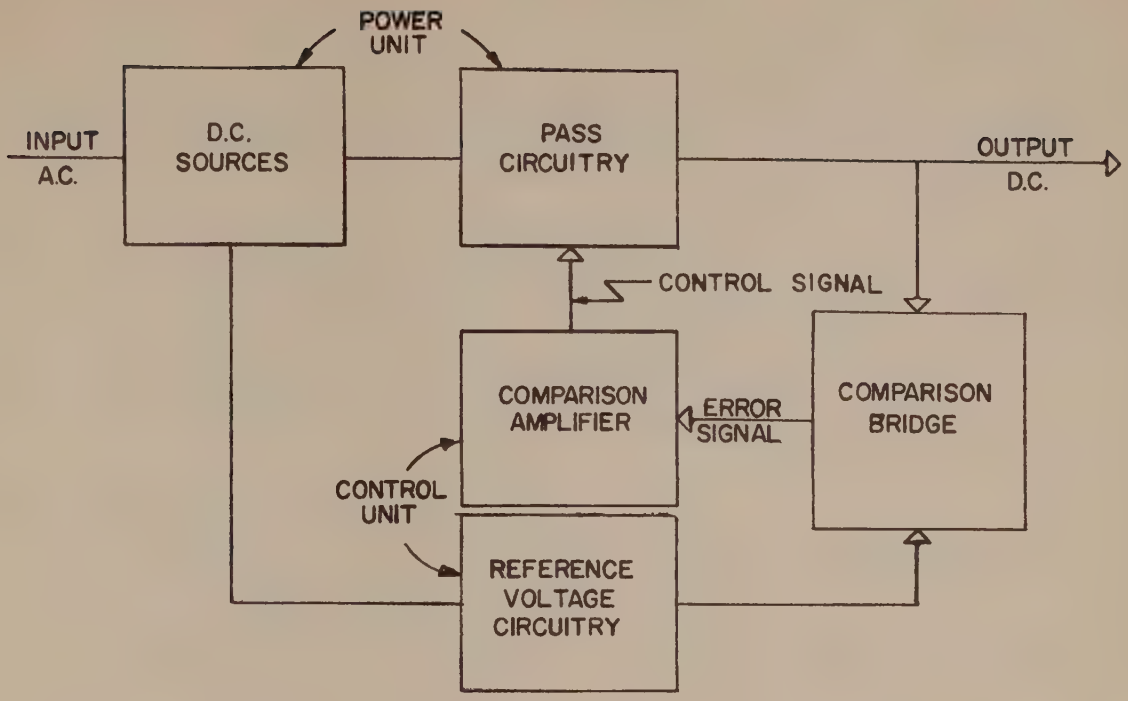
This bridge circuit implements the comparison between the OUTPUT VOLTAGE and the REFERENCE VOLTAGE. The signal produced by the comparison drives the COMPARISON AMPLIFIER.

Balance occurs in the Comparison Bridge when the following ratios are equal:

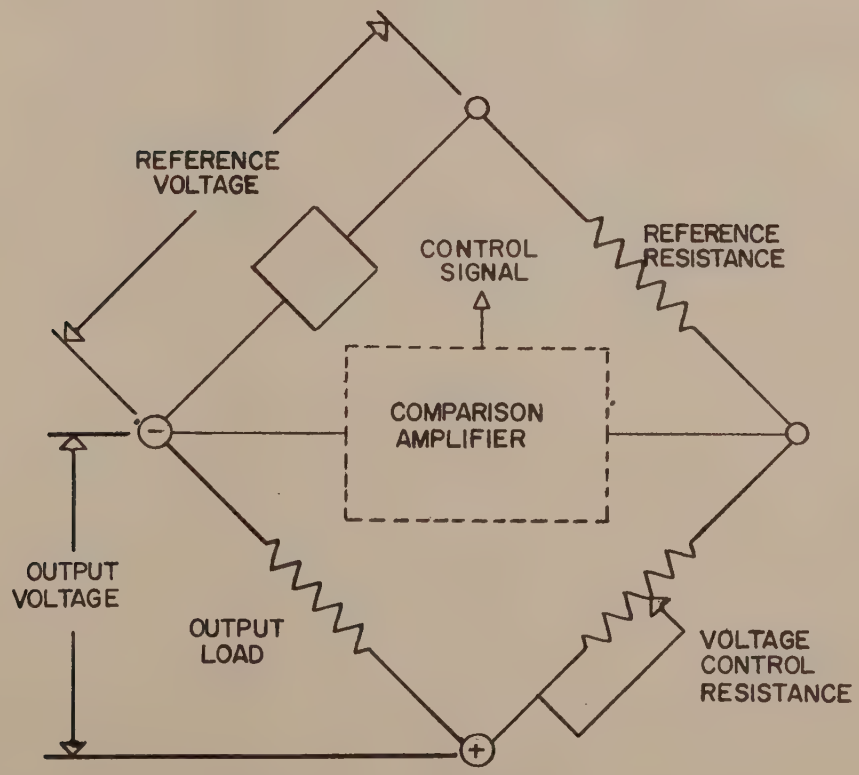
$$\frac{\text{Output Voltage}}{\text{Voltage Control Resistance}} = \frac{\text{Reference Voltage}}{\text{Reference Resistance}}$$

When, for example, the Comparison Bridge is unbalance by a decreasing output voltage drop across the load, it gives rise to a negative signal at the base of the COMPARISON FOLLOWER in the COMPARISON AMPLIFIER circuit. This signal is amplified in cascade and communicated to the pass elements as a negative base input aiding their forward conduction and consequently increasing the output voltage.

A bridge unbalance caused by an increasing output voltage produces, of course, a chain of oppositely biased circuit responses which reduce the voltage across the load.



(DIAGRAM B-1) *VOLTAGE REGULATED POWER SUPPLY*



(DIAGRAM B-2) *COMPARISON BRIDGE*

This power supply is shipped without any internal packing material; and may be put into operation immediately. It is designed for rack and for bench use. Carrying handles are provided on front panel.

....INTIAL "TURN - ON" PROCEDURE:

1. Adjust VOLTAGE CONTROL to approximate mid-range position.
2. With POWER ON-OFF switch set in "OFF" position, connect line cord to 115 v ac, 60 cps input power. If outlet is not polarized use 3 to 2 - prong adapter supplied with unit.
3. Set POWER ON-OFF switch to "ON" position.
4. Adjust VOLTAGE CONTROL to obtain desired output voltage.

....GENERAL OPERATION:

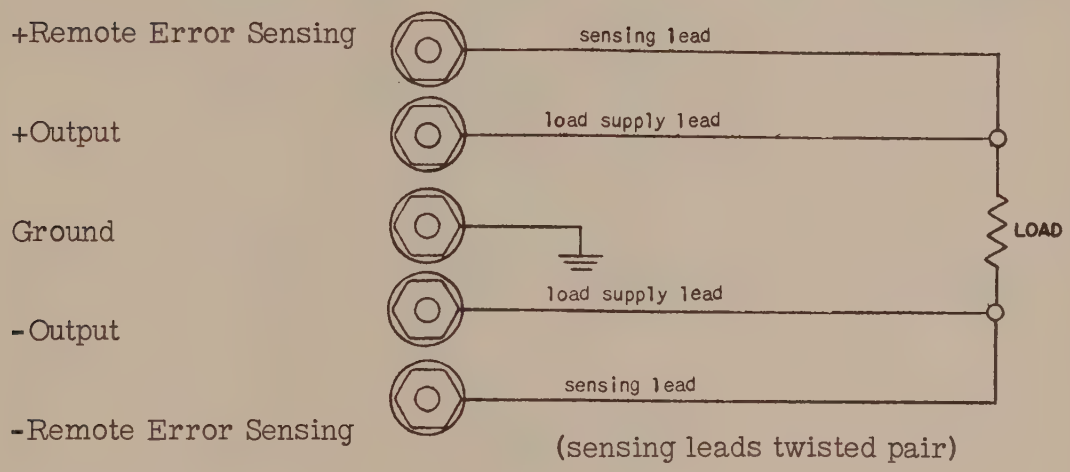
1. Once it has been determined that the unit is functioning satisfactorily, it is subsequently unnecessary to follow the INITIAL TURN-ON PROCEDURE.
2. The VOLTAGE CONTROL may be left fixed at any setting and the power turned "ON" and "OFF" without any harmful effects.

....MAINTENANCE AND REPAIR:

1. Under normal operating conditions, no mechanical maintenance of any kind should be required. Conservatively rated electrical components assure long trouble-free operating life.
2. Exceptional component accessibility, provided by resistor board construction and plug-in sub-assemblies, facilitates servicing, should it be required. It is emphatically recommended that trouble-shooting be handled by personnel highly familiar with transistor circuitry, - preferably with experience in closed-loop designs.
3. This unit should not be returned to the manufacturer without proper authorization and shipping instructions. In any correspondence with the factory regarding repair, the model, serial number, and symptoms of malfunction must be included.

REMOTE ERROR SENSING OPERATION

(Terminal Connections)



(Procedure)

1. With AC input power disconnected, remove jumpers between plus and minus Output terminals and Remote Error Sensing terminals on the rear of the unit.

2. Using twisted pair wire, connect sensing leads from positive and negative Remote Error Sensing terminals to the load (observing polarities).

3. Using twisted pair wire, connect load supply leads from positive and negative Output terminals.

IMPORTANT NOTE: This unit should not be operated with Remote Error Sensing if the voltage drop across the load supply leads exceeds 0.5 volt (maximum) per lead at maximum rated output current.

Schematic Part No.	Kepco Part No.	Description	Specifications	Mfr.	Mfr's. No.
B201	149-0013	Fan, Venturi		Rotron	Muffin Fan
		Capacitors:			
C201-203	117-0249	Electrolytic, Can Type	1 K µf 450 v + 50, -10%	Industrial Cond.	40B808
C204	117-0280	Paper, Can Type	8 µf 660 v ac 5%	Industrial Cond.	2465-SVR
C206	117-0295	Mylar	0.5 µf 1000 v 10%	Hopkins Eng.	P56M
C205	117-0249	Electrolytic, Can Type	1 K µf 450 v + 50, -10%	Industrial Cond.	40B808
C301	117-0163	Ceramic	0.05 µf 500 v + 80, -20%	Sprague	36C142A1
C302	117-0147	Electrolytic, Pigtail Type	10 µf 150 v + 50, -10%	Industrial Cond.	10B912RM
C401	117-0114	Electrolytic, Pigtail Type	350 µf 50 v +100, -10%	Industrial Cond.	1B844
C402	117-0222	Electrolytic, Pigtail Type	100 µf 200 v + 50, -10%	Industrial Cond.	20B317RM
C403, 404	117-0221	Electrolytic, Pigtail Type	500 µf 50 v +100, -10%	Industrial Cond.	1B1163RM
C405, 406	117-0163	Ceramic	0.05 µf 500 v 20%	Sprague	36C142A1
C501	117-0151	Electrolytic, Pigtail Type	20 µf 450 v + 50, -10%	Industrial Cond.	45RM20
C502	117-0073	Mylar	0.1 µf 1000 v 20%	Good-All	620S104010W
		Rectifiers:			
CR201	124-0090	Silicon, Stack Type		Kepco	124-0090
CR301-304, 403, 404	124-0028	Silicon, Pigtail Type		Automatic Mfg.	PT-5
CR401, 402, 405, 408	124-0084	Silicon, Pigtail Type		Transitron	SL-91
F101	141-0010	Fuse, Instantaneous	15 a 250 v	Bussmann	ABC-15
F102	141-0028	Fuse, Slow Blow	3 a 125 v	Bussmann	MDX-3
F401	141-0012	Fuse, Instantaneous	2 a 250 v	Bussmann	AGC-2

Schematic Part No.	Kepco Part No.	Description	Specifications	Mfr.	Mfr's. No.
M101	135-0157	Meter	400 v dc 2-1/2"	Gen. Electric	8DW91V206AY2
M102	135-0154	Meter	2 a dc 2-1/2"	Gen. Electric	8DW91A225BR2
		(Meters apply only to SM 325-2M, SM 325-2MX)			
PL101	153-0024	Pilot Light		Gen. Electric	NE-51
Q301	119-0022	Transistor, PNP		Tung-Sol	2N382
Q302	119-0034	Transistor, PNP		Delco	2N1172
		Resistors:			
R201	115-0977	Fixed, Power, Strip	1.5 K Ω 40 w 5%	Ward Leonard	40S1500
R202	115-0967	Fixed, Power, Strip	20 Ω 20 w 5%	Ward Leonard	20S20
R203	115-0594	Fixed, Power, Strip	100 Ω 40 w 5%	Ward Leonard	40S100
R205	115-0770	Fixed, Power, Strip	10 K Ω 20 w 5%	Ward Leonard	20S10000
R206, 207	115-1020	Fixed, Power, Ribbon	2.5 Ω 40 w 5%	Hardwicke Hindle	Type BR
R208	115-0834	Fixed, Power, Ribbon	1 Ω 40 w 5%	Hardwicke Hindle	Type BR
R209	115-0552	Variable, Wire Wound	50 K Ω 4 w 5%	Gen. Radio	975-Q
R210, 211	115-0699	Fixed, Power, Strip	2 K Ω 40 w 5%	Ward Leonard	40S2000
R212, 213	115-0718	Fixed, Molded	47 Ω 1/2 w 10%	Allen-Bradley	EB4701
R214	115-0681	Fixed, Molded	33 Ω 1/2 w 10%	Allen-Bradley	EB3301
R215	115-0502	Fixed, Molded	10 Ω 1/2 w 10%	Allen-Bradley	EB1001
R301	115-0641	Fixed, Power, Axial	50 Ω 3 w 5%	Ward Leonard	3X50
R302	115-0630	Fixed, Molded	470 Ω 1 w 10%	Allen-Bradley	GB4711
R303	115-0559	Fixed, Molded	5.6 K Ω 1/2 w 5%	Allen-Bradley	EB5625
R304	115-0960	Fixed, Molded	1 K Ω 1 w 5%	Allen-Bradley	GB1025
R305	115-0444	Fixed, Power, Axial	300 Ω 3 w 5%	Ward Leonard	3X300
R306	115-0807	Fixed, Molded	180 Ω 1/2 w 5%	Allen-Bradley	EB1815
R307	115-0250	Fixed, Molded	330 K Ω 1/2 w 5%	Allen-Bradley	EB3345
R308	115-0512	Fixed, Power, Axial	1 K Ω 5 w 5%	Ward Leonard	5X1000
R309	115-0809	Fixed, Molded	100 K Ω 1/2 w 10%	Allen-Bradley	EB1041

Schematic Part No.	Kepco Part No.	Description	Specifications	Mfr.	Mfr's. No.
		Resistors:(continued)			
R310	115-0547	Fixed, Molded	1.0 K Ω 1/2 w 10%	Allen-Bradley	EB1021
RL101	140-0040	Relay	3PDT	Kurman	26D3C
S101	127-0107	Switch, Toggle	SPST	Carling	AA252-71-2
T201	100-1193	Transformer, Flux-O-Tran		Kepco Magnetic	100-1193
T202	175-0399	Transformer, Variable		Superior Elec.	Q216U
T401	100-1179	Transformer		Kepco	100-1179
AZ/1N1374	109-0019	RECTIFIER ASSEMBLY			
		Includes the following:			
1 ea.	121-0018	Reference Diode		Hoffman	1N1374
AO/SP67B	110-0122	PASS ASSEMBLY (STAT)			
		Includes the following:			
1 ea.	119-0037	Transistor, PNP		Motorola	SP67B*
2CO.2/SP67B	110-0116	PASS ASSEMBLY (STAT)			
		Includes the following:			
2 ea.	115-0891	Resistor, Fixed, Power, Axial	0.2 Ω 5 w 5%	Ward Leonard	7/8"-Y-0.2Ω Axiohm-5%
2 ea.	119-0037	Transistor, PNP		Motorola	SP67B*
2CO.2TC/SP67B	110-0123	PASS ASSEMBLY (STAT)			
		Includes the following:			
2 ea.	115-0891	Resistor, Fixed, Power, Axial	0.2 Ω 5 w 5%	Ward Leonard	7/8"-Y-0.2Ω Axiohm-5%
2 ea.	119-0037	Transistor, PNP		Motorola	SP67B*
1 ea.	127-0093	Switch, Thermostat	N.C.	Chatham Cont.	DRSCORP73C

*=Field Replacement: Motorola 2N1167

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REPLACEMENT PARTS LIST

Control Unit, Model TRAM 31 — Code 4-2062 —

SCHEMATIC NO.	QTY.	DESCRIPTION	MFRS. NAME & PART NO. (See Note)	KEPCO PART NO.
C1	1	Capacitor, Electrolytic 10 µf, 50v; Pigtail	Industrial 05RM10	117-0136
C2	1	Capacitor, Mylar 2 µf, 200v	Hopkins 2P2M	117-0129
C3	1	Capacitor, Mylar 0.5 µf, 200v	Hopkins	117-0123
CR1,2	2	Rectifier, Silicon, Pigtail 500 ma, 100 PIV	Transitron SL-91	124-0084
L1	1	Choke, RF 550 microhenry	Miller 4649	176-0046
Q1	1	Transistor, PNP Equal to 2N1172	Delco 119-0034	119-0034
Q2-6; 8,10	7	Transistor, PNP Equal to 2N382	Tung-Sol 119-0022	119-0022
Q7,9	2	Transistor,NPN	General Transistor 119-0007	119-0007
R1,5	2	Resistor, Fixed, Molded 3.3 K ohms, 1/2w; 5%	Allen Bradley EB3325	115-0452
R2, 14	2	Resistor, Fixed, Molded 2.7 K ohms, 1/2w; 10%	Allen Bradley EB2721	115-0560
R3,4	2	Resistor, Fixed, Precision 500 ohms, 1w; 1%	Sage Electronics SAIW	115-1192
R6,7	2	Resistor, Fixed, Molded 6.8 K ohms, 1/2w; 5%	Allen Bradley EB6825	115-0579
R8	1	Resistor, Fixed, Precision 15K, 1/2w; 1%	Dale WS 1/2	115-0646
R9	1	Resistor, Power, Axial, WW 10 K ohm, 3w; 5%,LTC	Hardwick Hindle 9/16 GA	115-1162
R10	1	Resistor, Power, Axial 2.5 K ohms, 3w; 5%, WW	Ward Leonard 3X2500	115-0469
R11	1	Resistor, Fixed, Precision 400 ohms, 1w; 1%	Sage Electronics SAIW	115-1191

REPLACEMENT PARTS MAY BE ORDERED FROM KEPCO, INC. ORDERS SHOULD INCLUDE KEPCO PART NUMBER AND DESCRIPTION.

PLEASE NOTE: THE MANUFACTURER'S NAME AND PART NUMBER LISTED FOR EACH ITEM ON REPLACEMENT PARTS LISTS, REPRESENTS AT LEAST ONE SOURCE FOR THAT ITEM AND IS LISTED SOLELY FOR THE CONVENIENCE OF KEPCO EQUIPMENT OWNERS IN OBTAINING REPLACEMENT PARTS LOCALLY. WE RESERVE THE RIGHT TO USE EQUIVALENT ITEMS FROM ALTERNATE SOURCES. KEPCO, INC.

SCHEMATIC NO.	QTY.	DESCRIPTION	MFRS. NAME & PART NO. (See Note)	KEPCO PART NO.
R12 *Note 1	*	Resistor, Fixed, Precision 800 ohms, 1/2w; 1%	Sage Electronics 1050S	115-1193
R12 *Note 2	*	Resistor, Fixed, Precision 700 ohms, 1/2w; 1%	Sage Electronics 1050S	115-1194
R12 *Note 3	*	Resistor, Fixed, Precision 900 ohms, 1/2w; 1%	Sage Electronics 1050S	115-1195
R13	1	Resistor, Power, Axial 500 ohms, 3w; 5%, LTC	Ward Leonard 3X500 LTC	115-0938
R15	1	Resistor, Fixed, Molded 20 ohms, 1/2w; 5%	Allen Bradley EB2005	115-0508
R16	1	Resistor, Fixed, Molded 160 K ohms, 1/2w; 5%	Allen Bradley EB1645	115-1024
R17	1	Resistor, Fixed, Molded 10 K ohm, 1/2w; 5%	Allen Bradley EB1035	115-0249
R18	1	Resistor, Fixed, Molded 300 ohms, 1/2w; 5%	Allen Bradley EB3015	115-0783
R19	1	Resistor, Power, Axial, WW 250 ohms, 3w; 5%, LTC	Hardwick Hindle 9/16 GA	115-1161
R20,24	2	Resistor, Power, Axial, WW 10 ohms, 3w; 5%, LTC	Hardwick Hindle 9/16 GA	115-1160
R21	1	Resistor, Fixed, Molded 100 ohms, 1w; 5%	Allen Bradley GB1015	115-0902
R22	1	Resistor, Variable, Multiturn 200 ohms, 1/4 w; 10%,25 t	Bourns Labs Trimit 271-1-201	115-0863
R23	1	Resistor, Fixed, Molded 180 ohms, 1/2w; 5%	Allen Bradley EB1815	115-0807
R25	1	Resistor, Fixed, Molded 10 ohms, 1/2w; 10%	Allen Bradley EB1001	115-0818
RD1	1	Reference Diode Zener, 6.2v, 10 ma	Hoffman IN429	121-0001

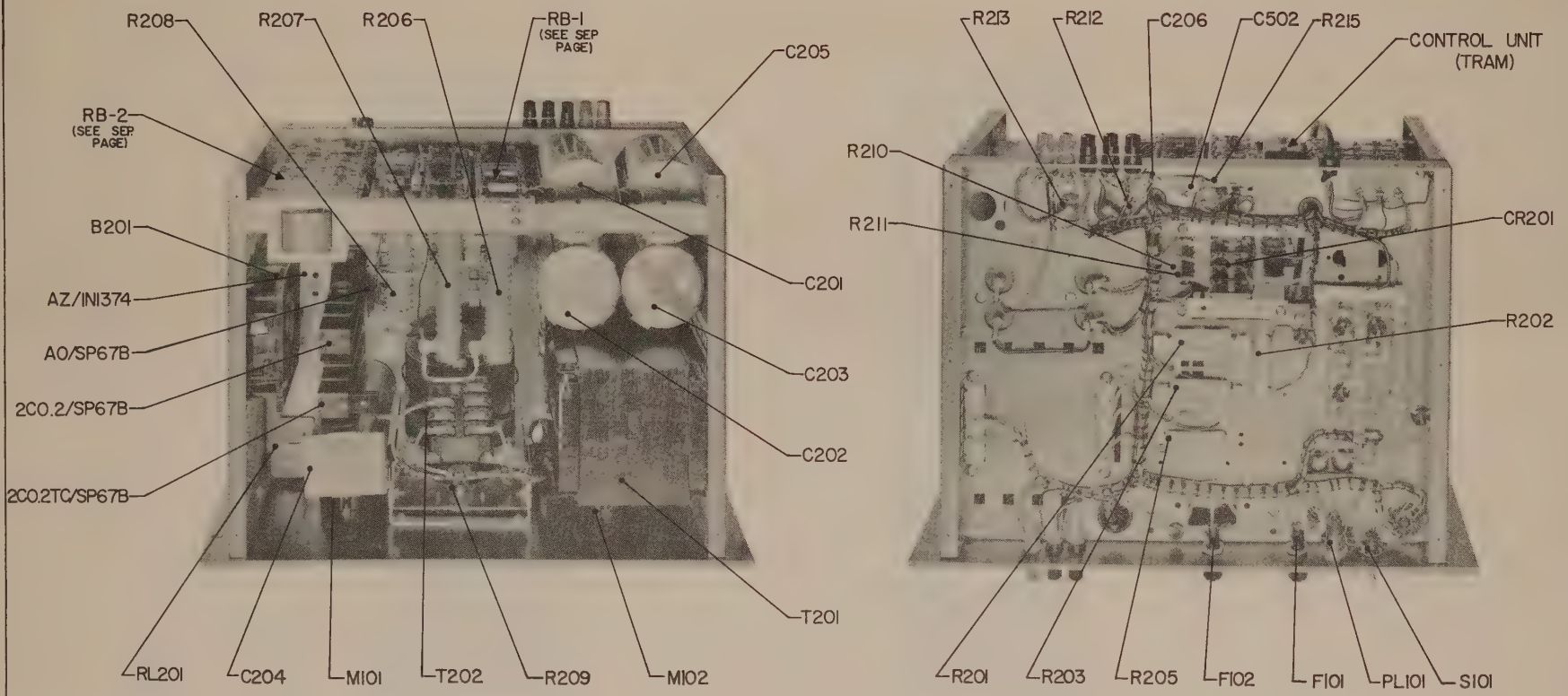
*Note 1- R12 is 800 ohms, Part no. 115-1193 in following Models:
SM 14-7X; SM 14-15X; SM 14-30X; SM 36-5X; SM 36-10X; SM 36-15X

*Note 2- R12 is 700 ohms, Part no. 115-1194 in following Models:
SM 75-2X; SM 75-5X; SM 75-8X; SM 160-1X; SM 160-2X; SM 160-4X

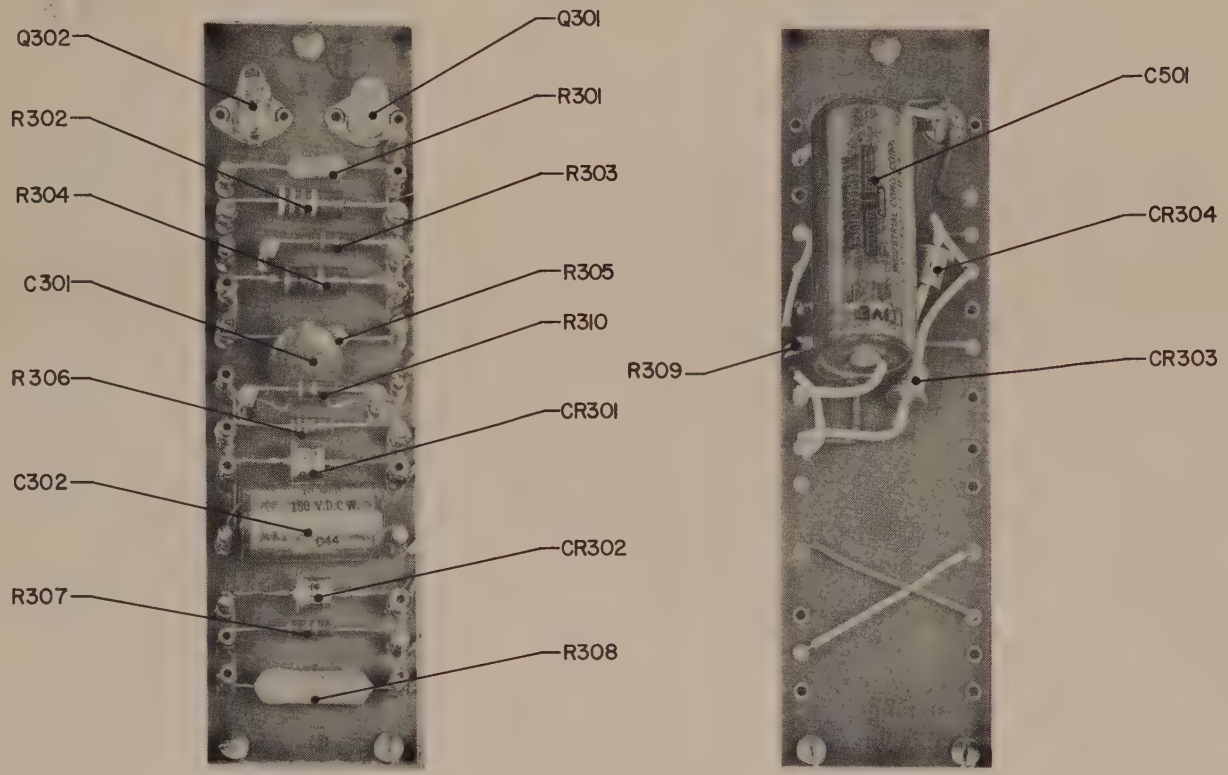
*Note 3 - R12 is 900 ohms, Part no. 115-1195 in following Models:
SM 325-0.5X; SM 325-1X; SM 325-2X

REPLACEMENT PARTS MAY BE ORDERED FROM KEPCO, INC. ORDERS SHOULD INCLUDE KEPCO PART NUMBER AND DESCRIPTION.

PLEASE NOTE: THE MANUFACTURER'S NAME AND PART NUMBER LISTED FOR EACH ITEM ON REPLACEMENT PARTS LISTS, REPRESENTS AT LEAST ONE SOURCE FOR THAT ITEM AND IS LISTED SOLELY FOR THE CONVENIENCE OF KEPCO EQUIPMENT OWNERS IN OBTAINING REPLACEMENT PARTS LOCALLY. WE RESERVE THE RIGHT TO USE EQUIVALENT ITEMS FROM ALTERNATE SOURCES. KEPCO, INC.

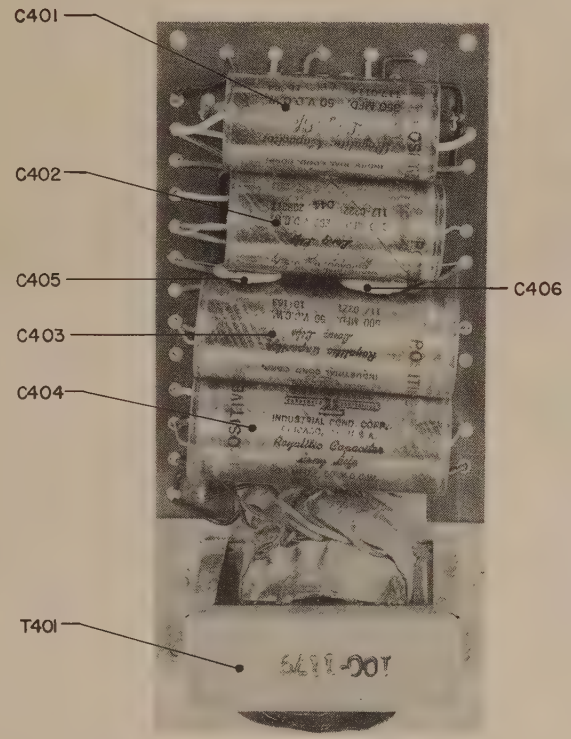


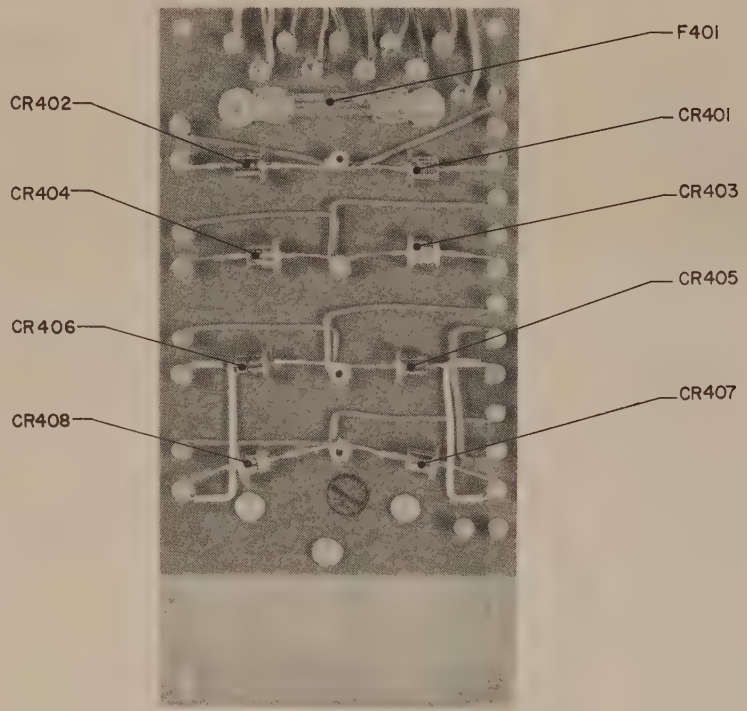
KEPCO INC.	
FLUSHING NEW YORK	
ITEM: POWER UNIT	DES. 9-5-61
	APPD J.P.K.
MODEL SM-325-2	DFTM R.C.
DWG. No. CM01079	CHKD



CORRECTIONS, IF ANY, APPEAR ON SHEET ATTACHED TO REAR COVER

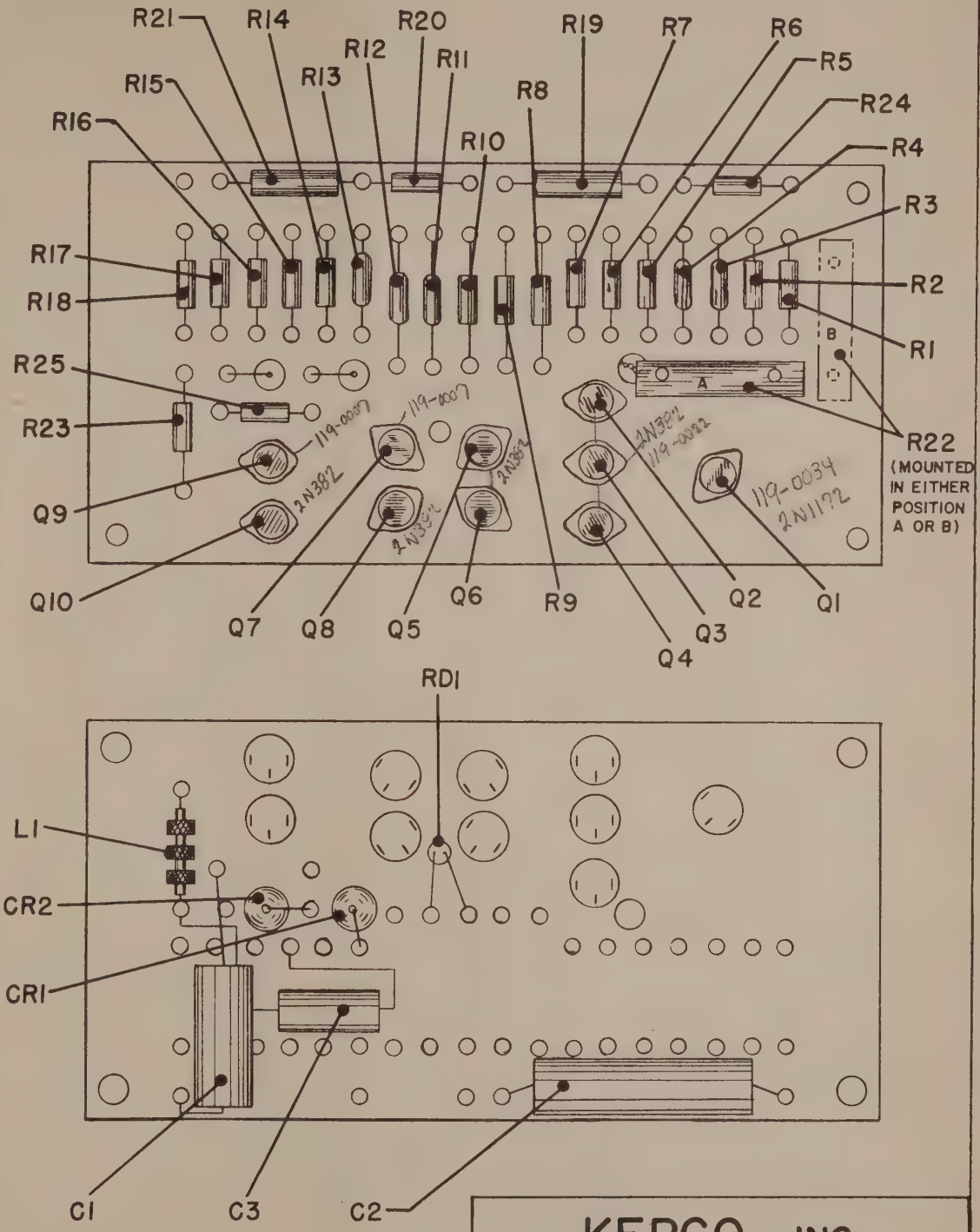
KEPCO LABORATORIES	
FLUSHING	NEW YORK
ITEM RB-1	DES 3-2-61
	APPD
MODEL SM-325-2	DFTM R.C.
DWG. No BM01074	CHKD





CORRECTIONS, IF ANY, APPEAR ON SHEET ATTACHED TO REAR COVER

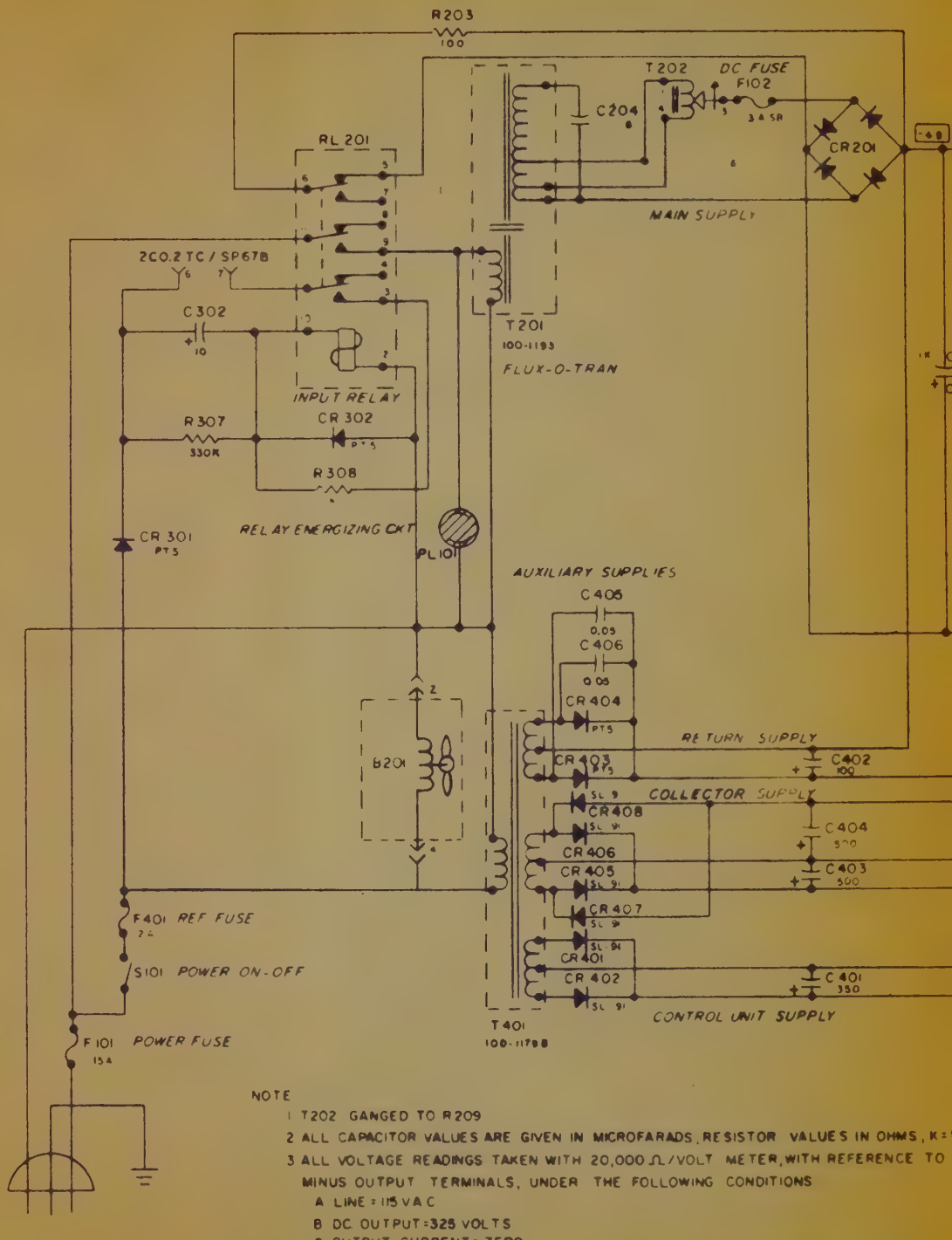
KEPCO INC.	
FLUSHING NEW YORK	
ITEM RB-2	DES. 1-3-61
	APPD
MODEL SM—— SERIES	DFTM M.CEA
DWG. No. BM00923	CHKD



KEPCO INC.	
FLUSHING NEW YORK	
ITEM: CONTROL UNIT	DES. 12-6-61
	APPD
MODEL TRAM 31	DFTM M. RAYNER
DWG. No AM01809	CHKD

INPUT CONTROL

DC SOURCES



NOTE

1 T202 GANGED TO R209

2 ALL CAPACITOR VALUES ARE GIVEN IN MICROFARADS, RESISTOR VALUES IN OHMS, K=

3 ALL VOLTAGE READINGS TAKEN WITH 20,000 Ω/VOLT METER, WITH REFERENCE TO MINUS OUTPUT TERMINALS, UNDER THE FOLLOWING CONDITIONS

A LINE = 115 VAC

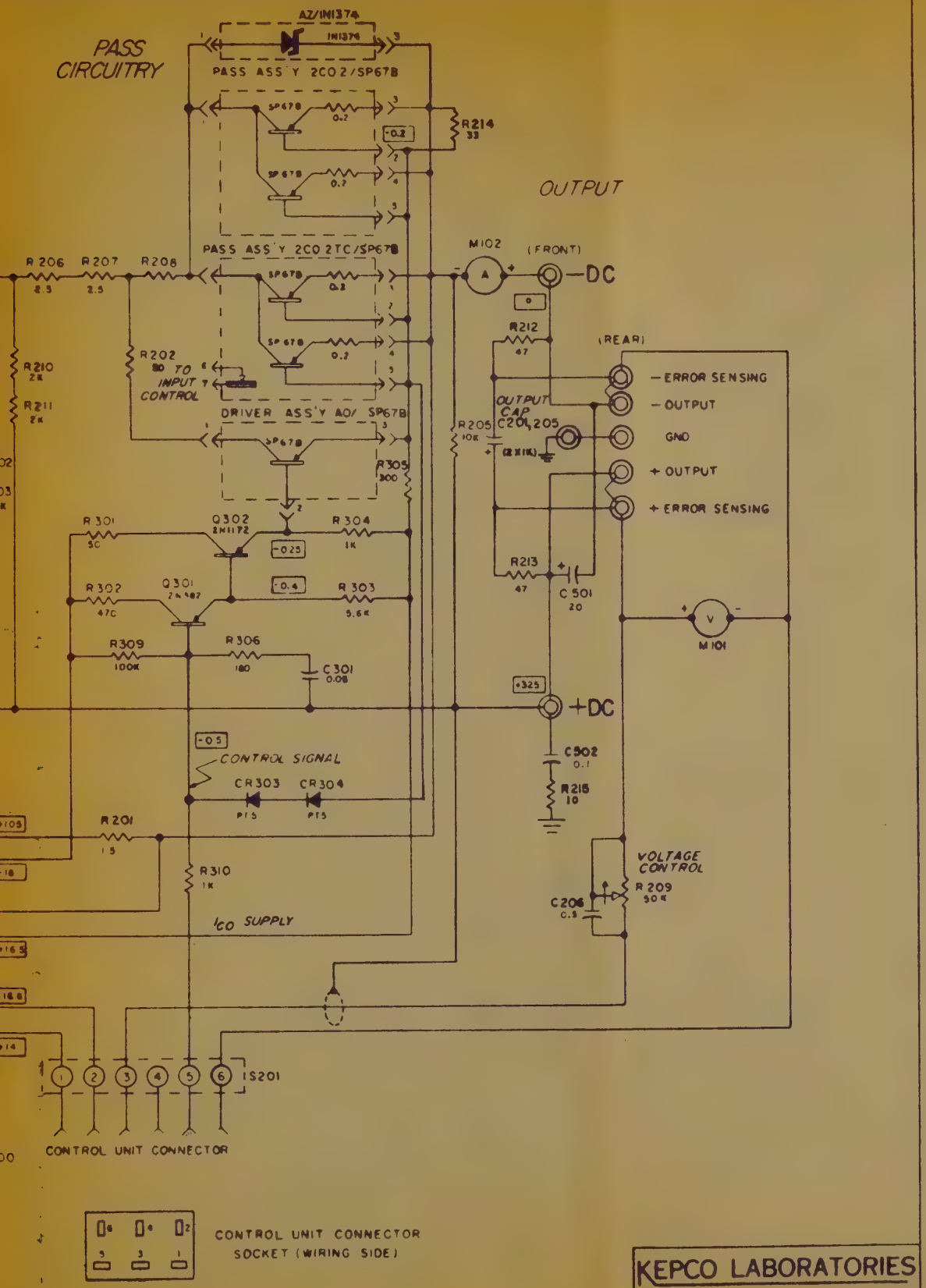
B DC OUTPUT = 325 VOLTS

C OUTPUT CURRENT = ZERO

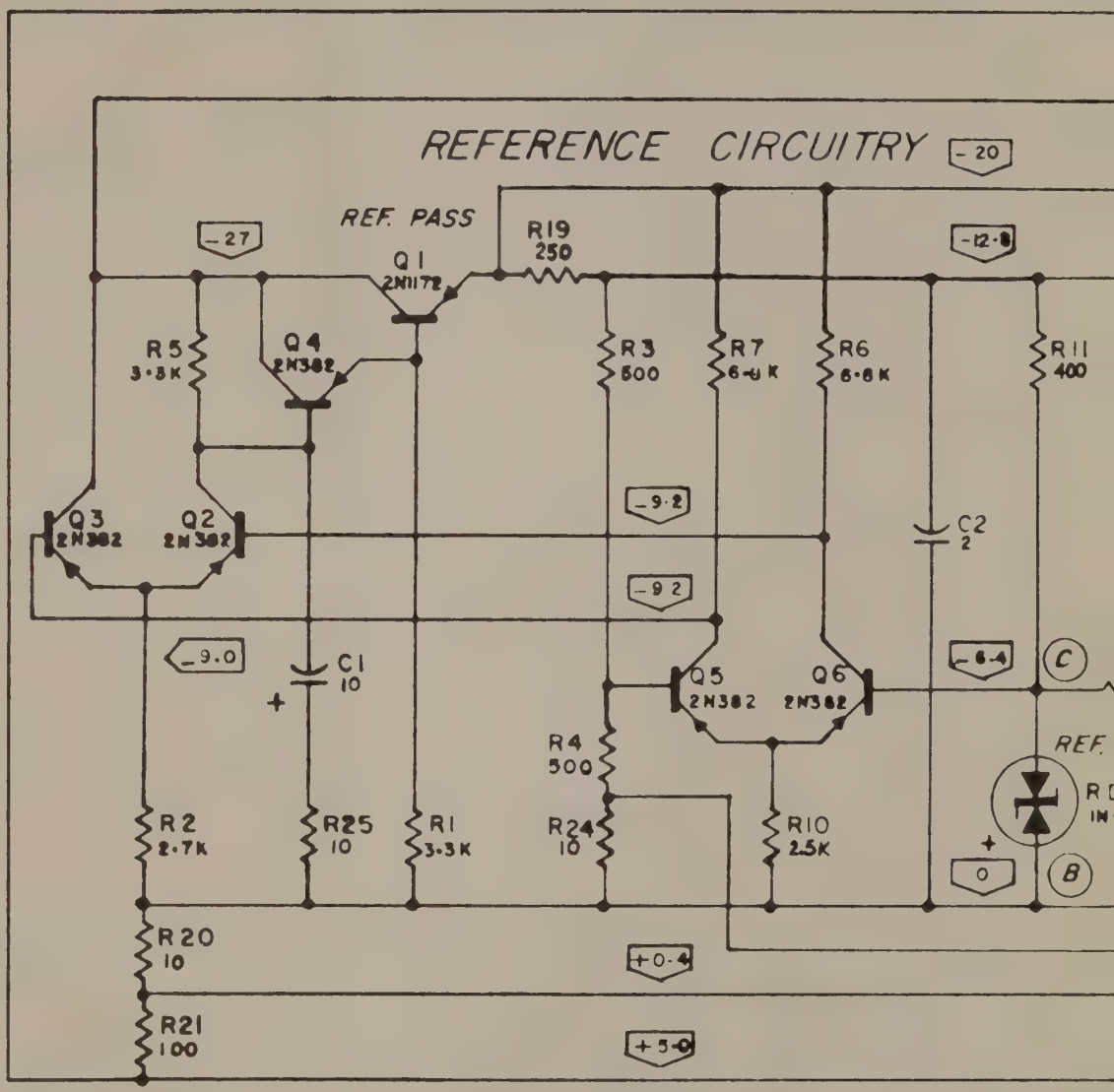
4 VOLTAGES ARE TYPICAL AND ARE SUBJECT TO NORMAL COMPONENT TOLERANCE

5 METERS M101, M102 APPLY ONLY TO SM-325-2 M AND SM 325-2 MX MODELS

6 ORDER REPLACEMENT PARTS BY KEPCO PART NUMBER PROVIDED IN PARTS LIST SECTION



KEPCO LABORATORIES	
FLUSHING, NEW YORK	
TITLE: POWER UNIT	DES: J.R.G.
	APPD: AR 10-24-61
MODEL: SM-325-2M	DRTR: M.C.
DWG No. C-M00494	CHKD: J.P.K.



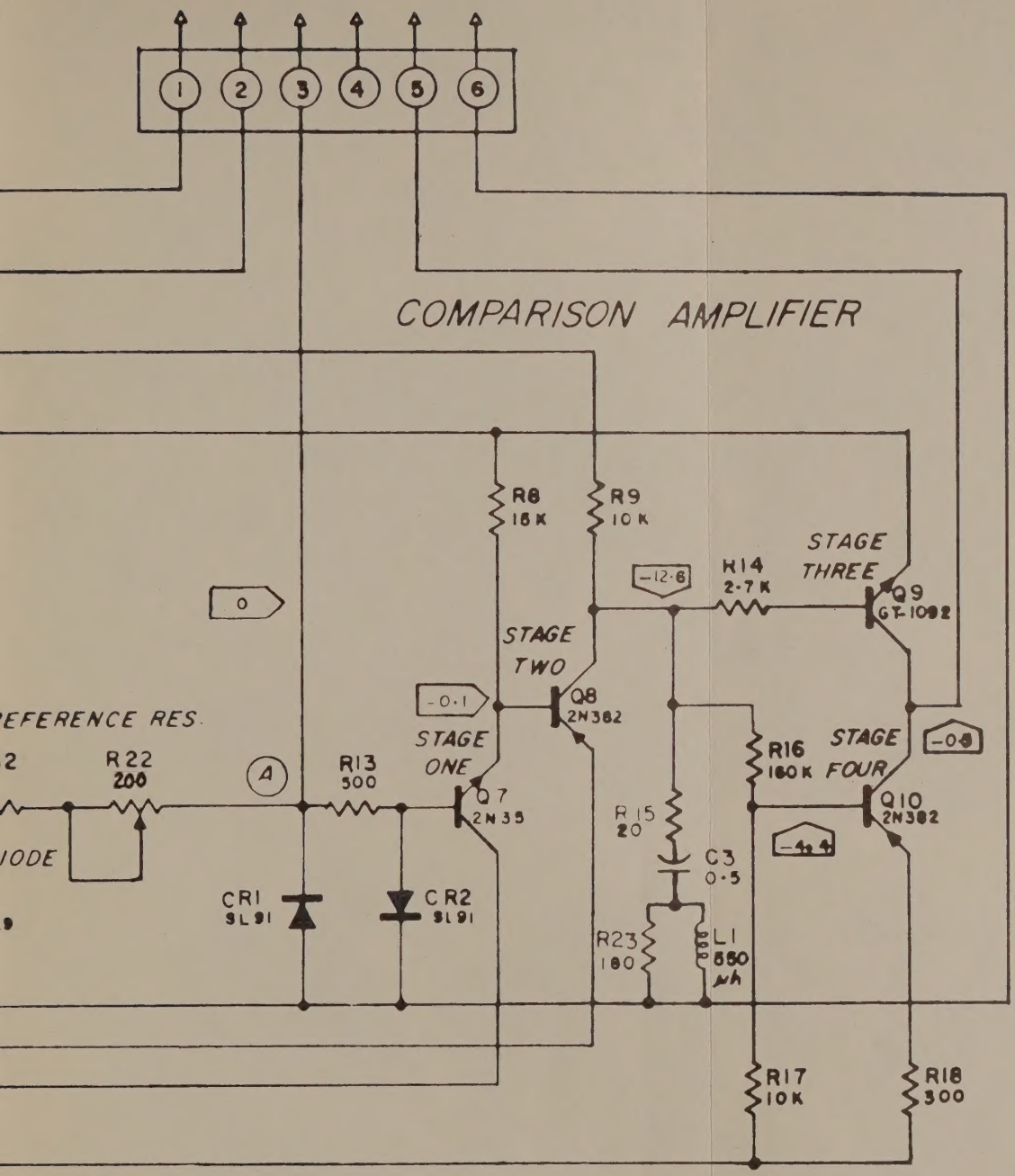
NOTE :

1. ALL VOLTAGES TAKEN UNDER CONDITIONS SPECIFIED ON MAIN SCHEMATIC.
2. ORDER REPLACEMENT PARTS BY KEPCO PART NUMBE PROVIDED IN PARTS LISTS SECTION.

(*) MODELS: SM14-7X; SM14-15X; SM14-30X; SM36-10X; SM36-5X; SM3

(**) MODELS: SM75-2X; SM75-5X; SM75-8X; SM160-2X; SM160-1X; SM

(***) MODELS: SM325-1X; SM325-2X



-15 X

60-4X; SM325-0.5 X

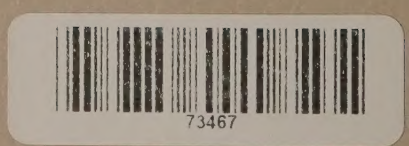
KEPCO PART NO.	
MODEL TRAM 31	
SEE KEPCO PARTS LIST.	
FOR COMPLETE DESCRIP.	
C1	117-0136
C2	117-0129
C3	117-0123
CR1	124-0084
CR2	124-0084
L1	176-0046
Q1	119-0034
Q2	119-0022
Q3	119-0022
Q4	119-0022
Q5	119-0022
Q6	119-0022
Q7	119-0007
Q8	119-0022
Q9	119-0007
Q10	119-0022
R1	115-0452
R2	115-0560
R3	115-1192
R4	115-1192
R5	115-0452
R6	115-0579
R7	115-0579
R8	115-0646
R9	115-1162
R10	115-0469
R11	115-1191
R12(#)	115-1193
R12(**)	115-1194
R12(***)	115-1195
R13	115-0938
R14	115-0560
R15	115-0508
R16	115-1024
R17	115-0249
R18	115-0783
R19	115-1161
R20	115-1160
R21	115-0902
R22	115-0863
R23	115-0807
R24	115-1160
R25	115-0818
RD1	121-0001

KEPCO INC.

FLUSHING, N.Y.

TITLE: CONTROL UNIT

DRAWN	CHECKED	APPROVED	DATE
C. A.	P.K.	A. [illegible]	4-20-62
MODEL NO. TRAM - 31		PART NO.	SCALE
DWG. NO. B M00629			4



kepco inc.®

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146-0045 - 1/62 -12M